REMARKS

This amendment is responsive to the Office Action dated October 27, 2003. Applicant has amended claims 36, 50, 52 and 54. Claims 36-55 are still pending. Applicant respectfully submits that the current amendments raise no new issues with respect to the patentability of Applicant's claims and would require no additional search by the Examiner. Accordingly, entry of the amendments is courteously solicited.

In the Office Action, the Examiner rejected claims 36-42, 45-47, 50-52 and 54-55 under 35 U.S.C. 102(b) as being anticipated by Sugimoto (JP 01-023440) (hereafter Sugimoto). In addition, the Examiner rejected claims 36-43, 44-52 and 54-55 under 35 U.S.C. 103(a) as being unpatentable over Sugimoto in view of Kashiwagi et al (EP 0418897) (hereafter Kashiwagi) and Folger et al. (US 3,565,978) (hereafter Folger); and rejected claims 36-55 under 35 U.S.C. 103(a) as being unpatentable over Sugimoto in view of Kashiwagi and Folger combined with Daecher et al. (US 6,183,839) (hereafter Daecher).

In rejecting Applicant's claims, the Examiner once again stated that Sugimoto describes a master having a 1.1 micron groove and a 1.6 micron pitch. The Examiner then stated that a 1.6 micron pitch divided by a 1.1 micron groove is 1.45, i.e., less than 2 and less than 1.6.

In Applicant's most recent response, Applicant identified a mistake in the Examiner's analysis. In particular, Applicant pointed out that Applicant's claims do not recite creation of a desired replica pattern defining a track pitch less than 2 multiplied by the *groove width*. Instead, Applicant's claims recite creation of a desired replica pattern defining a track pitch less than 2 multiplied by ***a laser spot size***. Groove width is entirely different from laser spot size.

In the current Office Action, the Examiner responded to Applicant's arguments by stating the following:

> The applicant is quite correct that the width of the groove and the spot size of the laser are not the same, but these are related. The arguments of the applicant fail to account for the use of defocusing of the laser beam in the reference (see page 4 of the translation describing the process conditions according to the invention). Among these is that only a single pass of the laser is disclosed, the 0.57 value for k assumed by the applicant does not apply between optical systems merely due to the use of similar lasers, the high laser power used (5.7 mW vs 3.0 mW), the use of defocusing and the sensitivity of the photoresist. The formula appearing on page 1 of the instant specification and relied upon by the applicant relates to the diffraction limit of the focus only for a particular system. It does n t address defocused situations such as that used in the reference. The diameter of the

beam will be larger than the groove formed in the resist due primarily to the sensitivity of the resist. The wings (edges of the (Gaussian) beam) will not have sufficient intensity to expose the resist and the width of the groove is likely measured at ½ height, not the top. The top of the groove will be wider and the bottom narrower due to the approximately Gaussian intensity distribution of the laser beam (for gas lasers, such as argon ion and HeCd operating in TEM00 mode). Therefore the laser spot size is at least the width of the groove due to the single pass and due to the sensitivity of the resist and the lower intensity of the laser at the edges of the beam, likely somewhat wider. In the reference the groove is 1.1 microns and the pitch is 1.6. Even assuming the best case for the applicant's argued position (the laser being the same width as the groove), the laser is 1.45 times the pitch of the tracking grooves, which meets the limitation of the claims. The problem with eh current claims language is that it fails to account for duty cycles in the pitch that are less than 0.5 (ie. Cases where the grooves and lands are different widths) and where the dimensions of the lands and grooves are relatively large.

The Examiner's statement that "the laser spot size is at least the width of the groove" is troubling to Applicant. In making this statement, the Examiner is defining laser spot size in a manner that is inconsistent with Applicant's specification and previous remarks on the record, and using this contrived definition of laser spot size to state that the laser spot size in Sugimoto is at least the width of the grooves. Interestingly, the Examiner's applied definition of laser spot size would result in infinitely sized laser spots for a Gaussian distribution.

In particular, the Examiner is arguing that groove widths are defined by the width at ½ height, but that the laser spot size is measured by its full width at any intensity. If the definition of spot size advanced by the Examiner were true, then all Gaussian laser spot sizes would be infinite in size because the spot size of Gaussian distribution of light approaches infinity as the intensity approaches zero. Applicant submits that the definition of spot size advanced by the Examiner to support the Examiner's argument that spot sizes used in Sugimoto are as wide or wider than groove widths is an unreasonable and incorrect definition of spot size. If a proper definition of spot size is applied, the Examiner's argument that spot sizes used in Sugimoto are as wide or wider than groove widths does not hold true.

Laser spot size is well defined in Applicant's specification and previous responses, as referring to the spot size at a full width at half maximum intensity. In the interest of expediting prosecution toward issuance, Applicant has amended all independent claims to recite that the laser spot size is defined by a full width at half maximum intensity. Accordingly, all pending claims now recite a method comprising laser etching a photosensitive master to form a master pattern

that is inverse of a desired replica pattern, the desired replica pattern defining a track pitch less than 2 multiplied by a laser spot size associated with a laser used to perform the laser etching, wherein the laser spot size is defined by a full width at half maximum intensity. Applicant submits that this limitation was inherent in Applicant's claims prior to this amendment, and therefore raise no new issues. The amendment is for purposes of clarity and reasons unrelated to patentability.

Applicant respectfully submits that none of the applied references discloses or suggests the techniques recited in Applicant's independent claims. With laser spot size defined and interpreted as being the spot size at full width at half maximum intensity, the Examiner's argument that the spot sizes used in Sugimoto are as big or larger than groove widths is no longer valid.

Groove width is entirely different from laser spot size. Applicant's pending claims recite laser etching a photosensitive master to form a master pattern that is inverse of a desired replica pattern, the desired replica pattern defining a track pitch less than 2 multiplied by a laser spot size associated with a laser used to perform the laser etching, wherein the laser spot size is defined by a full width at half maximum intensity. Such a technique is not disclosed or suggested in any of the applied references. Accordingly, all pending claims should be allowed.

Applicant's dependent claims should also be allowed for at least this reason. Moreover, Applicant points out that the features of Applicant's dependent claims must be read in conjunction with the features of Applicant's independent claims. The Daecher reference cited by the Examiner in rejecting various dependent claims that recite track pitch limitations, for example, appears to have little or nothing in common with the techniques recited in Applicant's independent claims, or the other applied references. Accordingly, the Examiner has clearly failed to identify any motivation in the prior art that would have suggested use of the pitches or spiral grooves relied upon by the Examiner from Daecher with unrelated teaching of the other applied references.

Applicant has also amended claims 50 and 54. As amended, claim 50 recites a method comprising laser etching a photosensitive master down to a substrate interface to form a master pattern that is inverse of a desired replica pattern, the desired replica pattern defining a track pitch less than 2 multiplied by a laser spot size associated with a laser used to perform the laser etching, wherein the laser spot size is defined by a full width at half maximum intensity according to an equation *(constant) (λ) / (NA)*, where the constant is approximately equal to 0.57, λ is a

wavelength associated with the laser and NA is a numerical aperture used in the laser etching. Claim 54 recites similar limitations.

Applicant points out that in replying to Applicant's most recent response, the Examiner has already addressed the equation which is being added to claims 50 and 54. Therefore, the amendments to claims 50 and 54 should raise no new issues and should not require additional search by the Examiner. Accordingly, entry of the amendments are courteously solicited.

In the Office Action, the Examiner stated that "the 0.57 value for k (the constant) assumed by the applicant does not apply between optical systems... the formula [*(0.57) (λ) / (NA)*] relied upon by the applicant relates to the diffraction limit of focus for a particular system."

The Examiner is correct that the 0.57 value for k is an approximate value. In particular, for practical systems the approximate value of 0.57 may fall within a range of 0.54 to 0.60. Applicant submits that anything outside of this range, however, is generally impractical for effective and efficient laser etching. Moreover, Applicant is aware of no prior art that discloses or suggests use of a constant (k) value outside the range of 0.54 to 0.60.

If the Examiner's position is that k (the constant) can have any value, the Examiner should find prior art that would support such a position. In actuality, the equation *(constant) (λ) / (NA)* holds true for practical laser etching systems where the constant is within a range of 0.54 to 0.60, i.e., approximately 0.57. The other features recited in Applicant's claims 54 and 54 cannot be read by the Examiner with respect to hypothetical and impractial systems having unreasonable values of k (the constant), because claims 50 and 54 now specifically recite the equation *(constant) (λ) / (NA)*, where the constant is approximately equal to 0.57.

Therefore, with regard to claims 50 and 54, the mathematical proof submitted in Applicant's last response clearly holds true. Moreover, with respect to claims 50 and 54, the Examiner cannot challenge Applicant's mathematical proof by attacking the validity of the mathematics, as applied across different systems, because claims 50 and 54 are now clearly limited to such practical systems for which the mathematics used in Applicant's proof indeed apply.

To reiterate Applicant's mathematical proof and show that the features of claims 50 and 54 are not disclosed or suggested in Sugimoto, Applicant provides the proof once again, as follows.

As specifically claimed in claims 50 and 54, the laser spot size given by the following equation:

SS = (constant) λ / NA,

where (constant) is approximately equal to 0.57

λ is the wavelength of the laser, and

NA is the numerical aperture.

Sugimoto discusses the use of Helium-Cadmium lasers and Argon lasers. At the time Sugimoto was filed, Helium-Cadmium lasers typically operated at a wavelength of 442 nanometers (.442 microns), and Argon lasers typically operated at a wavelength of 457 nanometers (.457 microns). Sugimoto discusses two different numerical apertures (NA), the first being 0.93 and the second being 0.70. As identified by the Examiner, the track pitch discussed in Sugimoto is 1.6 microns.

The use of Helium-Cadmium lasers or Argon lasers, and numerical apertures of 0.93 and 0.70, yield the following four potential spot sizes at a constant (k) value equal to 0.57:

SS = 0.57 (.457)/ 0.93 = 0.280 microns

SS = 0.57 (.442)/ 0.93 = 0.271 microns

SS= 0.57 (.457)/ 0.70 = 0.372 microns

SS= 0.57 (.442)/ 0.70 = 0.360 microns

At a constant value equal to exactly 0.54 (i.e., still approximately 0.57), the following four potential spot sizes are defined:

SS = 0.54 (.457)/ 0.93 = 0.265 microns

SS = 0.54 (.442)/ 0.93 = **0.257 microns**

SS= 0.54 (.457)/ 0.70 = 0.353 microns

SS= 0.54 (.442)/ 0.70 = 0.341 microns

At a constant value equal to exactly 0.60 (i.e., still approximately 0.57), the following four potential spot sizes are defined:

SS = 0.60 (.457)/ 0.93 = 0.295 microns

SS = 0.60 (.442)/ 0.93 = 0.285 microns

SS= 0.60 (.457)/ 0.70 = **0.392 microns**

SS= 0.60 (.442)/ 0.70 = 0.378 microns

Therefore, assuming the wavelengths and numerical apertures used in Sugimoto, the spot size, as defined in claims 50 and 54, is approximately within the range of **0.257 microns to 0.392 microns.**

Clearly, the 1.6 micron track pitch discussed in Sugimoto is not less than (2) multiplied by any laser spot size within the range of **0.257 microns to 0.392 microns** associated with the Sugimoto system. For this reason, Sugimoto clearly does not disclose or suggest the features of claims 50 and 54. For this reason, claims 50 and 54 and the respective dependent claims should be allowed.

Under the Examiner's analysis, the constant (k) value would need to exceed a value of 1.2 in order for the Sugimoto reference to possibly read on Applicant's claims. A constant value of 1.2 is not approximately equal to 0.57 as recited in claims 50 and 54.

Moreover, Applicant submits that a constant value of 1.2 would result in a mastering system that is generally useless from a practical standpoint. Indeed, nothing in the prior art even suggests such a system.

Applicant notes that the inclusion of the equation *(constant) (λ) / (NA)*, where the constant is approximately equal to 0.57, is not even necessary to distinguish Applicant's claims from any prior art system. Accordingly, the Examiner should not use the inclusion of the equation *(constant) (λ) / (NA)* in claims 50 and 54 as a basis for rejecting claim 36, which does not recite the equation.

In its current form, claim 36 could only possibly be anticipated by Sugimoto, if the Examiner can show that Sugimoto suggests constant values (k) that are greater than 1.2 and used with Argon laser at the aperture 0.70. The Examiner cannot show this, however, because constant values greater than 1.2 are so far fetched that Applicant surmises that no one has ever conceived of using such an inefficient laser etching system, for any reason.

With laser spot size defined and interpreted as being the spot size at full width at half maximum intensity, the Examiner's argument that the spot sizes used in Sugimoto are as big or larger than groove widths is no longer valid. Accordingly, claim 36 is clearly novel and non-obvious over Sugimoto even without specific recitation of the equation *(constant) (λ) / (NA)* which has been added to claims 50 and 54. All pending claims should be allowed.

The Issue of Intended Use

Although this point should be moot in view of the forgoing comments, Applicant also continues to traverse the Examiner's position that "the language concerning a replica is intended use." Applicant's claims positively recite the formation of a master disk pattern that is the inverse of a desired replica pattern. Applicant is still confused as to why the Examiner continues to ignore this structural feature of Applicant's claims under the guise of "intended use."

In mastering techniques, a pattern is defined on the master. The pattern can be the desired pattern, or the inverse pattern desired for a replica disk. In the former case, first or third generation stampers would be used to create the replicas that looked like the master. In the later case, second or fourth generation stampers would be used to create replicas that were inverse of the master. These different processes, however, are not interchangeable.

The Examiner's position appears to be that one could create a pattern on a master and then create either even or odd generation media using various stampers created from that master. Applicant points out, however, that the pattern on the master is not defined when the replica is created. Rather, the pattern on the master is defined on the master, either as a replica pattern or an inverse of the replica pattern. The pattern on the master is therefore structural. Accordingly, it should be considered by the Examiner as such.

The Examiner's notion that a person with skill in the art would have intended to create either even or odd generation media from the same master is nonsensical. Moreover, the Examiner has cited absolutely no teaching in the art of optical disk mastering that would suggest that such use would have been intended. On the contrary, it clearly would not have been an intended use to a person with ordinary skill in the art.

The structural pattern on the master defines both the structure of the replica and the process for creating the replica, e.g., defining whether the replica will be created by a stamper that is the inverse of the master or a stamper that has a pattern like the master. A person with skill in the art would never have used (or intended to use) a first generation or third stamper to create a medium when the master defines an inverse of a desired replica disk pattern. Moreover, the Examiner has identified no teaching within the art of optical disk mastering that would suggest otherwise.

Applicant respectfully encourages the Examiner to recognize the structural difference between a master that defines a desired pattern and a master that defines an inverse of a desired pattern. Such masters are clearly not interchangeable, as the Examiner's argument would imply.

In a mastering system, the laser etching creates the master pattern, e.g., often varying the intensity of the laser or providing wobble to the laser to encode information. The master pattern can be the desired replica disk pattern, or an inverse of the desired replica disk pattern. However, the master pattern cannot be both a desired replica disk pattern and the inverse of the desired replica disk pattern, as the Examiner suggests. Moreover, nothing in the prior art would suggest that a master pattern could be both a desired replica disk pattern and the inverse of the desired replica disk pattern. The fact is that the phrase "a master pattern that is inverse of a desired replica pattern" is a structural feature on the master and should be given proper consideration by the Examiner as such.

Applicant's claimed invention can achieve highly desirable advantages of improved track pitches and desirable mastering feature characteristics. In particular, by using Applicant's claimed laser etching technique, a laser etching system can be used to create media of improved storage density relative to the same system, if conventional mastering techniques are used instead. The prior art is simply devoid of any description of the features set forth in Applicant's claims, which require laser etching a photosensitive master to form a master pattern that is inverse of a desired replica pattern, the desired replica pattern defining a track pitch less than 2 multiplied by a laser spot size associated with a laser used to perform the laser etching.

The laser spot size must be properly interpreted by the Examiner as being the laser spot size defined by a full width at half maximum intensity. Given this proper definition of laser spot size, as specifically recited in all of Applicant's claims, the Examiner's contrived arguments with respect to Sugimoto cannot hold true. Moreover, some of Applicant's claims now specifically recite the mathematical equation for calculating the spot size, and are therefore limited to practical systems, and not some hypothetical system. Interestingly, in making the rejections, the Examiner has not even found support in the prior art for a system having an unreasonable value for k (the constant) that would be needed to support the Examiner's arguments. Nevertheless, Applicant has made amendments to further clarify the issues in the interest f expediting prosecution towards issuance.

As a final note, Applicant also points out that claim 48 positively recites the creation of replicas. In the Office Action, the Examiner stated: "applicant has not added the step of forming the replica, preferring to stop with the master. Therefore, the examiner holds that the step of forming the replica is not required to be shown to meet the claim."

This statement is clearly incorrect because claim 48 does recite the creation of replicas. Therefore, even if one accepted the Examiner's analysis, per the Examiner's comment above, Applicant's claim limitations relating the desired replica disk pattern should be given structural consideration with respect to claim 48, which does recite creation of the replicas.

CONCLUSION

All claims in this application are in condition for allowance. Applicant respectfully requests reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number 09-0069. The Examiner is invited to telephone the below-signed attorney to discuss this application.

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